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EXAMINER	
CHANG, JULIAN	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/705,676	RUUTU ET AL.	
	Examiner	Art Unit	
	JULIAN CHANG	2452	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5,7-14,16 and 18-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,7-14,16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is responsive to communication filed on 12/11/08. Claims 1-3, 5, 7-14, 16, 18-22 are pending, and have been examined.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 2, 11, 12, 13 and 22 are rejected under 35 U.S.C. 102(a) as being anticipated by Kar ("Internet Path Characterization Using Common Internet Tools", 2003).

3. Regarding claims 1, 11, 12 and 22, Kar teaches a method, a computer program product implementing said method, and a system implementing said method, said method comprising:

transmitting a first uplink packet of a first pair of packets ('sends a packet of size S', p. 126);

receiving a first downlink packet of the first pair of packets ('returns a packet of size R', p. 126);

determining a first RTT for the transmission and reception of the first pair of packets ('taking many measurements of round-trip times (RTT)', p. 125);

transmitting a second uplink packet of a second pair of packets (Perl script for loop increments probe packet size (i.e., S) after each iteration, and runs traceroute (i.e., exchanges packets), p. 126);

receiving a second downlink packet of the second pair of packets (Perl script for loop increments probe packet size (i.e., S) after each iteration, and runs traceroute (i.e., exchanges packets), p. 126);

determining a second RTT for the transmission and reception of the first pair of packets ('taking many measurements of round-trip times (RTT)', p. 125);

wherein the first uplink packet and the second uplink packet differ in size, and the first and second packets in the opposite direction have the same size (Perl script for loop increments probe packet size (i.e., S) after each iteration, on p. 126; 'E...the size of an ICMP error message', 'R=E', 'E is fixed', p. 126; Since R = E = constant size of an ICMP error message, the downlink packets are the same size).

4. Regarding claims 2 and 13, Kar teaches repeating an exchange of a pair of packets between a sender and a receiver with at least either the first and second uplink packets or the first and second downlink packets differing in size (Perl script for loop increments probe packet size (i.e., S) after each iteration, p. 126), and the round trip times for the respective exchanges are also again determined ('#Gets all rtt's from traceroute program', p. 126), and the sender then determines processed round trip times for each of the exchanges by performing a statistical analysis of the round trip

times for the respective exchanges (Figure 2 shows the graph after such minimum filtering (i.e., statistical analysis), pp. 126, 127).

5. Regarding claims 10 and 21, Kar teaches that determining a processed round trip time for each of the transmission and reception of the first pair of packets and the transmission and reception of the second pair of packets by performing a statistical analysis of the first round trip time and the second round trip time for the respective transmission and receptions ('Figure 2 show the graph after such minimum filtering', p. 127).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 7-9 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kar as applied to claims 1 and 12 above, and further in view of Vilalta, et al ("Predictive algorithms in the management of computer systems", 2002), hereinafter "Vilalta".

7. Regarding claims 7 and 18, Kar teaches estimating the capacities and delays of network links, but does not estimating capacities and delays based on already collected information and a dynamical quantity.

Vilalta teaches estimating a network variable, in this case httpops, based on already collected information and a dynamical quantity (p. 466, § "Removing mean and seasonal effects"). Vilalta teaches the use of data collected over a span of eight months to determine the effects of time of day, day of week, or even month of year on a network variable. By doing so, one could remove any seasonal effects from measurements of the network variable. It would have been obvious to apply such a technique to remove seasonal effects from measurements of another network variable, such as network delay.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to apply the technique taught in Vilalta in order to remove mean and seasonal effects.

8. Regarding claims 8 and 19, Kar-Vilalta teaches the invention substantially as claimed and described in claims 7 and 18 above, including that the dynamical quantity is the time of day (Vilalta: p. 466, § "Removing mean and seasonal effects").

9. Regarding claims 9 and 20, Kar-Vilalta teaches the invention substantially as claimed and described in claims 7 and 18 above, including that the dynamical quantity

is the time of day and the day of the week (Vilalta: p. 466, § "Removing mean and seasonal effects").

10. Claims 7-9 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kar as applied to claims 1 and 12 above, and further in view of Schulz, et al ("Prediction of Communication Performance for Wide Area Computing Systems, 2001), hereinafter "Schulz".

11. Regarding claims 7 and 18, Kar teaches estimating the capacities and delays of network links, but does not estimating capacities and delays based on already collected information and a dynamical quantity.

Schulz teaches estimating bandwidth and latency based on already collected information and a dynamic quantity (paragraph spanning pp. 482-483).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to apply the technique taught in Schulz in order to more accurately estimate bandwidth and latency.

12. Regarding claims 8 and 19, Kar-Schulz teaches the invention substantially as claimed and described in claims 7 and 18 above, including that the dynamical quantity is the time of day (Schulz: p.483, same daytimes).

13. Regarding claims 9 and 20, Kar-Schulz teaches the invention substantially as claimed and described in claims 7 and 18 above, including that the dynamical quantity is the time of day and the day of the week (Schulz: p. 483, same weekdays).

14. Claims 3-6 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kar as applied to claims 1 and 12 above, and further in view of applicant-admitted prior art.

15. Regarding claims 5 and 16, Kar teaches the invention substantially as claimed and described in claims 1 and 12 above, but fails to teach calculating uplink and downlink capacities, C_u and C_d using:

C_u = (s_uA - s_uB) / (t_A - t_B), and

C_d = s_d / [t_B - d_r - ((s_uB * (t_A - t_B)) / (s_uA - s_uB))].

Kar does however disclose that:

$$T_{SR} = S\sum_{i=1}^{i}\frac{1}{B_u(i)} + R\sum_{i=1}^{i}\frac{1}{B_d(i)} + K$$

where the sending host sends a packet of size S, and the receiving host returns a packet of size R, and K is the summation of propagation delays and processing delays (p. 126). Kar recognized that if the downstream packet size is constant, the equation simplifies, allowing one to calculate the upstream bandwidth as the inverse slope of RTT vs. upstream packet size (pp. 126, 127). One of ordinary skill in the art would have recognized from the teachings in Kar that if the upstream packet is kept

constant instead, one could easily calculate the downstream bandwidth as the inverse slope of RTT vs. downstream packet size.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to vary the uplink packet size instead of the downlink packet size in order to calculate the uplink bandwidth instead of downlink bandwidth.

Official notice was taken that one of ordinary skill in the art at the time of applicant's invention would have known that:

RTT = uplink delay + downlink delay + receiver delay

Delay = packet size / bandwidth

From the above formulas, that were well known, one can derive the following:

RTT = (uplink packet size / uplink bandwidth) + (downlink packet size / downlink bandwidth) + receiver delay

(downlink packet size / downlink bandwidth) = RTT - (uplink packet size / uplink bandwidth) - receiver delay

downlink bandwidth = downlink packet size / [RTT - (uplink packet size / uplink bandwidth) - receiver delay]

Since applicant has failed to timely traverse the statements taken under official notice, such statements are taken to be applicant-admitted prior art. See MPEP 2144.03.

It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the downlink bandwidth based on the measured uplink bandwidth

and the receiver delay in order to avoid repeating the probe to calculate the downlink bandwidth.

16. Regarding claims 3 and 14, Kar teaches a sender determining for a packet of size S the uplink and downlink delays D_u and D_d, using:

D_u = S (t_A - t_B) / (s_uA - s_uB), and

D_d = S [t_B - d_r - ((s_uB * (t_A - t_B)) / (s_uA - s_uB))] / s_d

Official notice is taken that one of ordinary skill in the art at the time of applicant's invention would have known that:

Delay = packet size / bandwidth

From this formula, and the formulas claimed in claims 5 and 16, one of ordinary skill in the art at the time of applicant's invention would have easily been able derive the formulas claimed in claims 3 and 14.

Since applicant has failed to timely traverse the statements taken under official notice, such statements are taken to be applicant-admitted prior art. See MPEP 2144.03.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to calculate delay based on measured bandwidth in order to avoid the need to measure delay.

17. Regarding claims 4 and 15, Kar teaches, in view of applicant-admitted prior art, the invention substantially as claimed and described in claims 3 and 14 above, including

that instead of the uplink packets in the first and second exchange of packets differing in size, the downlink packets differ in size (Kar: pp. 126, 127).

18. Regarding claims 6 and 17, Kar teaches, in view of applicant-admitted prior art, the invention substantially as claimed and described in claims 3 and 14 above, including that instead of the uplink packets in the first and second exchange of packets differing in size, the downlink packets differ in size (Kar: pp. 126, 127).

Response to Arguments

19. Applicant's arguments filed 12/11/08 have been fully considered but they are not persuasive.

a. Applicant argues with regard to claim 1 that Kar fails to teach sending a first and second uplink packet of different sizes, and receiving in return first and second downlink packets that are the same size. (Remarks 10).

Kar teaches measuring a upstream bandwidth using traceroute (§ 3, p. 125-128). Kar provides a Perl script for doing so (p. 126). This Perl script gets a series of RTT's from running traceroute while incrementing the size of the probe packet ('$size + 16', p. 126). These probing packets are the first and second uplink packets. Kar also discloses that in response to the probing packet, a packet of size R is returned (p. 126). Kar clearly discloses that R = E, where E is the size of an ICMP message, and has a constant size of 56 bytes (p. 126).

It is quite clear from the context of the disclosure that a packet of constant size R is returned for each traceroute invocation. Kar discloses that where the return packet is of a constant size, equation (1) simplifies to equation (2) (p. 126). Kar goes on to disclose that equation (2) represents a straight line where the RTT is a function of S (p. 126). If the return packet is not of the same size, Kar would not be able to measure the uplink bandwidth because equation (1) would not simplify into equation (2).

b. Applicant argues that the limitations of claim 3 are not addressed. The limitations of claim 3 that the first and second downlink packet have the same size and that s_uA is different from s_uB are simply reiterate what is claimed in claim 1. As shown above, Kar discloses the transmission of a series of traceroute probing packets of incremental sizes S, and the reception of return packets of a constant size R (the size of an ICMP error message of 56 bytes).

Conclusion

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JULIAN CHANG whose telephone number is (571)272-8631. The examiner can normally be reached on Monday thru Friday 9AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571) 272-3964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. C./

Examiner, Art Unit 2452

/Kenny S Lin/
Primary Examiner, Art Unit 2452